Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Americans are already stark. Medicare for All is urgently needed to stem and reverse the accelerating trends of hospital closure in rural regions across the USA.

We declare no competing interests.

*Meagan C Fitzpatrick, *Alison P Galvani*
alison.galvani@yale.edu

Center for Infectious Disease Modeling and Analysis, Yale School of Public Health, Yale University, New Haven, CT 06510, USA (MCF, APG); and Center for Vaccine Development and Global Health, University of Maryland School of Medicine, University of Maryland Baltimore, Baltimore, MD, USA (MCF)

1 Gujral K, Basu A. Impact of rural and urban hospital closures on inpatient mortality. June, 2020. https://www.nber.org/papers/w26182 (accessed Aug 19, 2020).
2 Galvani AP, Parpia AS, Foster EM, Singer BH, Fitzpatrick MC. Improving the prognosis of health care in the USA. *Lancet* 2020; **395:** 524–33.
3 Kaufman BG, Reiter KL, Pink GH, Holmes GM. Medicaid expansion affects rural and urban hospitals differently. *Health Aff* 2016; **35:** 1665–72.
4 American Hospital Association. Rural report 2019. 2019. https://www.aha.org/guidesreports/2019-02-04-rural-report-2019 (accessed Aug 19, 2020).
5 Bai G, Yehia F, Chen W, Anderson GF. Varying trends in the financial viability of US rural hospitals, 2011–17. *Health Aff* 2020; **39:** 942–48.
6 Cheeseman Day J. Health insurance in rural America. April 9, 2019. https://www.census.gov/library/stories/2019/04/health-insurance-rural-america.html (accessed Aug 20, 2020).
7 Woolhandler S, Himmelstein DU. Single-payer reform: the only way to fulfill the president's pledge of more coverage, better benefits, and lower costs. *Ann Intern Med* 2017; **166:** 587–88.

Asymptomatic health-care worker screening during the COVID-19 pandemic

We applaud the establishment of the COVIDsortium by Thomas Treibel and colleagues[1] as a bioresource focusing on asymptomatic health-care workers (HCWs).[1] However, we disagree with the authors' conclusion that "the rate of asymptomatic infection among HCWs more likely reflects general community transmission than in-hospital exposure". This report was an ecological study subject to the ecological fallacy. Moreover, the figure compares symptomatic inpatients who were tested in hospital with asymptomatic HCWs. It is possible that HCWs were exposed to asymptomatic patients who were infectious in the hospital or to patients with false-negative tests. The number of infections among HCWs was also most likely underestimated, as HCWs with symptoms or who were self-isolating were excluded.

The role of hospital exposures versus community exposures has been problematic for assessments of the occupational risk of other infectious diseases (eg, multidrug-resistant tuberculosis). Valid risks for disease were not appreciated until HCWs were compared with controls with similar educational and economic status, such as medical students versus chemical-engineering students.[2]

Finally, evidence exists that the risk to HCWs from severe acute respiratory syndrome coronavirus 2 is not only from community exposures but also from other types of exposures. Among 1423 HCWs in the USA with COVID-19, 780 (55%) HCWs reported contact with a patient with confirmed COVID-19 in the 14 days before the onset of their symptoms, whereas 384 (27%) reported contact only with a household member, 187 (13%) in a community setting, and 72 (5%) in more than one of these settings.[3] Some HCW exposures confer a higher risk than do others, and personal protective equipment and infection control training are associated with a decreased risk of infection.[4]

We declare no competing interests.

**Kevin Fennelly, Christopher C Whalen*
kevin.fennelly@nih.gov

National Heart, Lung, and Blood Institute, Bethesda, MD 20853, USA (KF); and Global Health Department of Epidemiology and Biostatistics, College of Public Health, University of Georgia, Athens, GA, USA (CCW)

1 Treibel TA, Manisty C, Burton M, et al. COVID-19: PCR screening of asymptomatic health-care workers at London hospital. *Lancet* 2020; **395:** 1608–10.
2 Silva VMC, Cunha AJLA, Oliveira JR, et al. Medical students at risk of nosocomial transmission of *Mycobacterium tuberculosis*. *Int J Tuberc Lung Dis* 2000; **4:** 420–26.
3 Burrer SL, De Perio MA, Hughes MM, et al. Characteristics of health care personnel with COVID-19—United States, February 12–April 9, 2020. *MMWR Morb Mortal Wkly Rep* 2020; **69:** 477–81.
4 Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Epidemiology of and risk factors for coronavirus infection in health care workers: a living rapid review. *Ann Intern Med* 2020; **173:** 120–36.

Mass testing of asymptomatic health-care workers (HCWs) has been suggested to reduce nosocomial transmission of COVID-19.[1] This level of testing might not be necessary in hospitals with protocols for personal protective equipment,[2] despite recommendations by Thomas Treibel and colleagues.[3] The 1600-bed Tan Tock Seng Hospital, Singapore, is colocated with the 330-bed National Centre for Infectious Diseases, Singapore, which, together, manage most patients with COVID-19 in Singapore. At this hospital, HCWs use fit-tested N95 respirators, eye protection, gloves, and gowns in areas where patients with COVID-19 are treated and wear surgical masks across the campus. A robust HCW sickness-surveillance system ensures that symptomatic staff are referred promptly for medical review.[4]

Since the first COVID-19 case,[5] the weekly number of new patients with COVID-19 admitted to Tan Tock Seng Hospital and National Centre for Infectious Diseases increased to 765 in epidemiological week 19 (ie, week ending May 9, 2020) and declined to 33 in epidemiological week 35 (ie, week ending Aug 29, 2020; appendix p 1). Only ten (0·08%) of 12 663 total HCWs were confirmed with COVID-19. Of the 141 work contacts of HCWs with confirmed COVID-19, 29 people were quarantined, 13 people were furloughed, and 99 people were placed under surveillance. Apart from one HCW, who was infected by another during social gatherings, five other symptomatic contacts were screened and found negative for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Five close

Sturti/Getty Images

See **Online** for appendix

patient contacts of HCWs who were confirmed to have COVID-19 also screened negative. No in-hospital clusters resulted from the HCWs with COVID-19. During this period, 35 acute respiratory illness clusters in HCWs were identified, but SARS-CoV-2 was not detected. One-time screening of 1378 asymptomatic housekeeping, facilities, information-technology, and security staff identified one (0·07%) person with COVID-19 infection. Since May 6, 2020, all HCWs with acute respiratory illness have been tested for SARS-CoV-2, further reducing the risk of nosocomial transmission. In hospitals that have staff who are well trained and supplied with personal protective equipment, have comprehensive sickness-surveillance systems, and have a universal mask policy, testing of asymptomatic HCWs would not be indicated.

See Online for appendix

We declare no competing interests.

*Angela Chow, Htet Lin Htun, Win Mar Kyaw, Lay Tin Lee, Brenda Ang
angela_chow@ttsh.com.sg

Department of Clinical Epidemiology, Office of Clinical Epidemiology, Analytics, and Knowledge (AC, HLH, WMK), Occupational Health Services (LTL), and Department of Infectious Diseases (BA), Tan Tock Seng Hospital, 308433 Singapore; and Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore (AC, BA)

1 Black JRM, Bailey C, Przewrocka J, Dijkstra KK, Swanton C. COVID-19: the case for health-care worker screening to prevent hospital transmission. *Lancet* 2020; **395:** 1418–20.
2 Hunter E, Price DA, Murphy E, et al. First experience of COVID-19 screening of health-care workers in England. *Lancet* 2020; **395:** e77–78.
3 Treibel TA, Manisty C, Burton M, et al. COVID-19: PCR screening of asymptomatic health-care workers at London hospital. *Lancet* 2020; **395:** 1608–10.
4 Htun HL, Lim DW, Kyaw WM, et al. Responding to the COVID-19 outbreak in Singapore: staff protection and staff temperature and sickness surveillance systems. *Clin Infect Dis* 2020; published online April 21. https://doi.org/10.1093/cid/ciaa468.
5 Ng Y, Li Z, Chua YX, et al. Evaluation of the effectiveness of surveillance and containment measures for the first 100 patients with COVID-19 in Singapore—January 2–February 29, 2020. *MMWR Morb Mortal Wkly Rep* 2020; **69:** 307–11.

Authors' reply

Kevin Fennelly and Christopher Whalen emphasise that health-care workers (HCWs) are at a higher risk of severe acute respiratory syndrome coronavirus 2 infection than are the general population. Angela Chow and colleagues describe their experience in Singapore of very low rates of HCW infections and nosocomial transmission when effective personal protective equipment is implemented. We agree with both perspectives, and our Correspondence[1] did not contradict either of these viewpoints.

Front-line HCWs have a reported hazard ratio of more than 3 compared with the general community.[2] This risk is variable between studies, with reported seropositivity rates in the UK ranging from 6% to 43% across different hospital settings.[3,4] Explanations for this variation include confounding by sampling timepoints during an emerging epidemic wave, participant selection (random *vs* symptomatic), and rates of self-isolation, and differences in the nature of exposures, policies for infection control, and use of personal protective equipment.

Our study was done when symptomatic HCWs were already required to quarantine. We sought to address the need for repeated mass screening of staff without disease-defining symptoms to help to reduce transmission associated with health care. Therefore, we focused on asymptomatic or pauci-symptomatic infection in HCWs at sequential timepoints during the first epidemic wave in London, UK, sampling only HCWs who attended work because they did not meet the symptomatic criteria to self-isolate. PCR-positive results peaked one week before the PCR-positive peak in London (which was at that time reflected mainly by symptomatic patients presenting to hospitals). We inferred from this that the peak of asymptomatic infection in our HCW cohort coincided with the peak of virus circulation in the community.[1] Thereafter, the rates of prevalent asymptomatic infection in our cohort reduced in line with the decline in community cases, despite a persistent number of patients with COVID-19 within the hospital. Further serial swabbing of HCWs over 16 weeks to mid-August, 2020, showed no new cases (appendix p 1) and neither did extension to two further hospitals and a total of 731 participants who were studied longitudinally (data not shown). The number of HCWs who were self-isolating fell to nearly zero over this time period. Despite some persistent hospitalised cases, zero cases were identified by PCR and nearly zero HCWs were self-quarantining by approximately 4 weeks after the peak, suggesting that nosocomial transmission had ceased. A key contributor to the absence of ongoing nosocomial transmission was likely to be the effective implementation of infection control practices.

Our approach to focus on asymptomatic infections underestimates the absolute incident rate of infections among HCWs, but it identifies the scale of infection missed by case-definition criteria and is likely to be a fair surrogate for the trend of incident infections. These data suggest that tracking community prevalence to trigger asymptomatic screening of HCWs is more informative than monitoring hospital caseloads.

Funding for the work presented in this Correspondence was donated by individuals, charitable Trusts, and corporations including Barts Charity (MRC0281), Goldman Sachs, Citadel and Citadel Securities, The Guy Foundation, GW Pharmaceuticals, Kusuma Trust, and Jagclif Charitable Trust. The funders had no role in study design, data collection, or the decision to publish this Correspondence. The corresponding author had full access to all data and final responsibility for the decision to submit for publication. JCM and CM are directly and indirectly supported by the University College London Hospitals (UCLH), Barts National Institute for Health Research (NIHR) Biomedical Research Centres and the British Heart Foundation (BHF) . TAT is funded by a BHF Intermediate Research Fellowship. MN is supported by a Wellcome Trust Investigator in Science Award and the UCLH NIHR Biomedical Research Centre. All other authors declare no competing interests.